Socio-Economic Technical Working Group Spring Rise Proposal

Draft of July 22, 2005

Title of Option: Modified Pallid Sturgeon Fish & Wildlife Proposal 1 7-21 (PAFW PROP 1 7-21)

Note: Excluding fish and wildlife resource interests (an authorized use which would continue to be significantly compromised/impacted) and certain recreational users, the members of the Socio-Economic Technical Working Group (SETWG) expressed unanimous support for the recommendations contained in this report. (The strongest divergence of opinion centered on the desirability of a single or bimodal rise.)

1. Description of the Proposal:

Tables 1A and1B provide general rationale for the following:

a. Number of Rises:

Strong preference for 1 mode; however, the SETWG has noted its preferences regarding a second rise should it be required below.

b. Flood Control Targets/constraints:

Minimal to no adjustment.

c. Timing, duration, magnitude, rise and fall rates of First Rise:

- **Timing:** Start of the First Rise should begin soon enough so release levels coincide with minimum navigation service release levels from Gavins Point by March 23rd (rise should begin March 21- 22 and decline to flow-to-target minimum navigation service levels by April 7th)
- **Magnitude:** < 35 kcfs. James River flows should count toward flow levels throughout the Spring Rise.
- **Rise:** As steep as possible
- **Fall:** As steep as possible

d. Timing, duration, magnitude of Flow Between Rises:

Minimum navigation service levels flow-to-target

e. Timing, duration, magnitude, rise and fall rates of Second Rise:

- **Timing:** Timing should be such that the initial 30% decline from the peak of the Second Rise should be completed as close as possible to May 21st.
- **Magnitude:** $\leq$52 kcfs. The critical component of magnitude is the length of time the peak is above the critical floodgate gate gage level (CFGGL, yet to be determined). Specifically, the peak above the CFGGL should be as short as possible, 1-3 days. Magnitude should be prorated based upon storage and the most up-to-date runoff predictions for areas above and below Sioux City. James River flows should count toward flow levels throughout the Spring Rise.
- **Rise:** As steep as possible
- **Fall:** As steep as possible down to the CFGGL. Duration and rate of fall are less critical once levels are below the CFGGL.

f. How does this address water availability? Variation for wet, normal or dry years (including Stop Protocols or precludes):

This rise is designed for dry conditions with regard to low mainstem storage levels and low runoff levels. By starting the rise later in May, storage is saved in upper basin reservoirs. Flow-to-target during May benefits system storage relative to the CWCP. Starting the second rise at flow-to-target levels will lessen the magnitude while still maintaining the delta (stage change). Mountain snowpack generally begins entering the system later in May allowing for timely replacement of storage in mainstem reservoirs. At the same time, by May 21, possibly earlier, agricultural interests down river face the inability to replant if the peak results in interior drainage problems.

Group should discuss stop protocols.

Flooding and/or a spring rise resulting in mainstem storage dropping to a level that threatens water intakes in the reservoirs (38 MAF)

g. Volume of water used:

Design incorporates socioeconomic recommendations into the Pallid Sturgeon Fish & Wildlife Proposal 1 7-21 (PAFW PROP 1 7-21). The SETWG will attempt to provide this calculation for presentation to the Plenary Group.

2. Hydrograph chart (with sideboards visually noted):

SETWG will attempt to have a hydrograph completed for presentation to the Plenary Group.

3. Anticipated effects

a. Proposal's anticipated effects on, or benefits to, Pallid Sturgeon (how does it assist in flow, timing, temperature, photoperiod, compare with historic hydrograph, comparison with historic flow percentiles, etc):

This proposal works off of recommendations from the Pallid Sturgeon Technical Working Group.

b. Proposal's anticipated effects on, or benefits to, socio-economic factors (how does this Proposal appear to affect water used in the basin, how to flows attenuate, effect on reservoir levels, navigation impacts, what modeling helps understand the effects):

The group provides general observations regarding impacts in Table 2. A thorough accounting of impacts is necessary and will require formal study.

c. Proposal's anticipated effects on, or benefits to, historic, cultural and burial sites (how does this Proposal appear to affect historic, cultural and burial sites in the basin, what modeling helps understand the effects):

This proposal will minimize losses to mainstem system storage. In fact because the May peak will now more closely coincide with mountain snowpack runoff, mainstem system storage from the start to finish of the spring rise may realize little relative change.

4. Brief description of monitoring methods and indicators:

A monitoring regime that measures impacts of the Spring Rise to all socio-economic interests/uses should be in place prior to implementation. The SETWG lacked expertise to develop a list of indicators and strategies and therefore recommends that an expert and impartial third party is identified to develop a monitoring regime. An ad-hoc committee should be appointed to select this group. The SETWG believes that mitigation and/or compensation strategies that are closely tied to the results of monitoring efforts should be evaluated.

Table 1A, Socio-Economic Interests Regarding Certain Characteristics of a ***First*** 2006 Spring Rise										
	DURATION	**TIMING**	**QUANTITY**	**MODES**	**RATE OF RISE**	**RATE OF FALL**	**PRE-RISE DISCHARGE**[1]	**PRECLUDE**[2]	**PRORATE**[3]	**FLOOD**[4] **CONTROL CONSTRAINT**
USE	S/L Short/Long	E/L Early/Late	1/2/3 Sm/Med/Large	1/2 Single/Bi	1/2/3 Slow/Med/Fast	1/2/3 Slow/Med/Fast	1/2/3 11-18/18-25/25-35	1/2/3/4/5 ≤31/≤35/≤40/≤45/≤57	1/2/3/4 ≤31/≤35/≤40/≤45	=/</0 (0=no change)
FC	S	E	1	1	3	3		4	4	0
Hydro	S	L	1	1	3	3		4	4	0
Therm	S	L[5]	1	1	3	3		4	4	0
Nav	S	E	1	1	3	3		5	5	0
W Supp	S	L	1	1	3	3		4	4	NA
W Qual	S/L[6]	L	1/2/3[7]	1	3	3		3	4	NA
Irr	S	E	1	1	3	3		3	4	NA
Rec	S	L[8]	1	1	3	3		3	4	NA
Ag	S	E[9]	1	1	3	3		5	5	0
Riparian	S	E	1	1	3	1		3	3	0
Fish/Wild	S/L	Mimic natur	3 or mimic	2	2	1		1	1	=

[1] Since system releases are at CWCP winter release levels prior to the first rise, pre-rise discharge is not an issue.
[2] These two terms are often intertwined with storage levels. Many of the concerns with fluctuations in storage levels and a spring rise are intimately tied with runoff in a given year. Concerns about fish production in reservoirs may be completely eliminated if runoff is sufficient to provide both a spring rise and rising elevations in mainstem reservoirs. Conversely, during a low runoff year, the harms to fish production will be exacerbated with the addition of a spring rise. This has very little to do with mainstem storage levels (other than surface area of water) and everything to do with the amount of water (runoff), coming into the system.
[3] Spring Rise may be prorated based on system storage or runoff.
[4] Flood control constraint is raised to a level equal to the Spring Rise (=), is raised to a level less than the Spring Rise (<), or is not raised at all.
[5] July or August.
[6] Increased storage improves water quality in reservoirs. Water quality in riverine stretches is maintained with sufficient flows.
[7] Ibid.
[8] Gamefish interests would prefer that a Spring Rise occur outside of the April 7 – May 31 spawning period.
[9] By May 21. The rise must be done early enough so that is does not compound the natural rise occurring during this period.

Table 1B, Socio-Economic Interests Regarding Certain Characteristics of a ***Second*** 2006 Spring Rise										
	DURATION	**TIMING**	**QUANTITY**	**MODES**	**RATE OF RISE**	**RATE OF FALL**	**PRE-RISE DISCHARGE**	**PRECLUDE** [10] [11] [12]	**PRORATE** [13]	**FLOOD CONTROL CONSTRAINT** [14]
USE	S/L Short/Long	E/L Early/Late	1/2/3 Sm/Med/Large	1/2 Single/Bi	1/2/3 Slow/Med/Fast	1/2/3 Slow/Med/Fast	1/2/3 11-18/18-25/25-35	1/2/3/4/5 ≤31/≤35/≤40/≤45/≤57	1/2/3/4 ≤31/≤35/≤40/≤45	=/</0 (0=no change)
FC	S	E	1	1	3	3	1	4	4	0
Hydro	S	L	1	1	3	3	1/2[15]	4	4	0
Therm	S	L[16]	1	1	3	3	1/2/3[17]	4	4	0
Nav	S	E	1	1	3	3	3[18]	5	5	0
W Supp	S	L	1	1	3	3	1/2[19]	4	4	NA
W Qual	S/L[20]	L	1/2/3[21]	1	3	3	1/2[22]	3	4	NA
Irr	S	E	1	1	3	3	1	3	4	NA
Rec	S	L[23]	1	1	3	3	1	3	4	NA
Ag	S	E[24]	1	1	3	3	1/2/3[25]	5	5	0
Riparian	S	E	1	1	3	1		3	3	0
Fish/Wild	S/L	Mimic natur	3 or mimic	2	2	1	1	1	1	=

[10] Spring Rise may be precluded based on system storage or runoff. Responses were made on the basis of a water consumptive spring rise. If the spring rise added water to storage in mainstem reservoirs through the flexibility afforded by a low (i.e. winter release level) pre-rise discharge, then a preclude would not be requested.

[11] If the annual spring rise in Oahe reservoir falls below 1578' feet MSL elevation on March 15, 2006 and/or if projections show at any time an MSL elevation for Oahe at or below 1567' we recommend a preclude to a 'spring rise' release. Maintaining these elevations is absolutely critical in maintaining an adequate water supply for at least 14,000 people living on or near the Cheyenne River Sioux Tribe Indian Reservation in central South Dakota.

[12] Preclude and proration are often intertwined with storage levels. Many of the concerns with fluctuations in storage levels and a spring rise are intimately tied with runoff in a given year. Concerns about fish production in reservoirs may be completely eliminated if runoff is sufficient to provide both a spring rise and rising elevations in mainstem reservoirs. Conversely, during a low runoff year, the harms to fish production will be exacerbated with the addition of a spring rise. This has very little to do with mainstem storage levels (other than surface area of water) and everything to do with the amount of water (runoff), coming into the system.

[13] Spring Rise may be prorated based on system storage or runoff.

[14] Flood control constraint is raised to a level equal to the Spring Rise (=), is raised to a level less than the Spring Rise (<), or is not raised at all.

[15] Releases should be sufficient to meet normal hydropower demands. Winter releases, a period of high power demand, are around generally about 11 kcfs. Pre-rise discharge would be at a time of lower power demand, April-May. Therefore a 1 is likely warranted. Moreover, by increasing storage, head is increased above the turbines and more water is available for release during the summer, another period of high hydropower demand.

[16] July or August.

[17] Low releases during April-May would not impact thermal power production. It may be a positive as more water would be available during the summer when greater quantities are needed for cooling. If the Spring Rise is later than April, a 2 would be more appropriate. If the second rise is later than May, a 3 may be more appropriate.

[18] See xxvi

[19] Releases should be sufficient to meet water supply needs. Water supply needs are met at winter release levels for riverine intakes. Early season (April/May) releases could be similar to winter releases and still meet riverine water intake/supply needs. Additionally, increased storage would benefit reservoir based water intakes. Therefore a 1 is likely warranted.

[20] Increased storage improves water quality in reservoirs. Water quality in riverine stretches is maintained with sufficient flows.

[21] Ibid.

[22] Ibid.

[23] Gamefish interests would prefer that a Spring Rise occur outside of the April 7 – May 31 spawning period.

[24] By May 21. The rise must be done early enough so that is does not compound the natural rise occurring during this period. *Dave Sieck will further clarify as necessary.*

[25] A lower pre-rise discharge would increase flood protection to flood plain agriculture.– Spring rise releases which decrease reservoir levels potentially decrease navigation days/service levels, or worse case scenario, precluding navigation (1" of service level = 17 tons/barge). The decreased flows would directly impact efficiency of the middle Mississippi River. (Note: Total economic impact to upper MS/IL River $2.3 billion/yr). If flow is reduced below navigation service levels in April, navigation would be severely crippled, since historically 40% of ag business is in April/early May. 1 barge = 58 trucks/increases to air pollution. Terminal access could be limited/lost by flooding during "rise." Declining reservoir levels would long-term negatively impact water available for navigation. Man-made flooding degrades navigation channel.

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Flood Control	FEMA Flood Insurance Program	Ruling from FEMA	National Weather Service/USACE	Policy Change / Pay no matter what
Flood Control	Internal Drainage	Pumping and/or Flood Insurance	Levee Board/USACE	Pay pumping costs and all crop loss
Flood Control	Bank Erosion above revetment	Rip-rap/rock is too low. It needs to be higher up the revetment	Levee Board/USACE	Replace revetment to project authorization
Flood Control	Levee overtop	Raise Levees	Levee Board/USACE	Policy change – pay for all floods including small floods. (or) Raise/Move levees (USACE pay)

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Hydropower	Flow regime changes from Gavins Point Dam required to support a Spring Rise may result in a shift in Mainstem hydropower generation from periods of peak electrical demand to off-peak periods. Such shifts could result in increased costs to the Western Area Power Administration (WAPA) to supply their firm commitments, thereby increasing the costs to their customers.	Additional costs ($) associated with hydropower capacity and energy marketed by WAPA.		
Hydropower	Flow regime changes from Gavins Point Dam required to support a SR will result in a shift in mainstem hydropower generation from seasonal periods of high demand to seasonal periods of low demand. Shifting generation to low demand periods has two impacts. Generation surpluses to Western's contractual commitments is sold at very low prices. To the extent that less water is available to meet contractual commitments, Western will have to purchase power at high prices and have no surplus power to sell at these high prices. Long term shifts in generation that results in Western increasing purchases and lost surplus sales could price Western's firm power out of the market and jeopardize repayment of the federal investment or force Western to reduce allocations and prompt construction of base load power plants (typically coal fired). Flows out of Gavin's Point of over 35,000 cfs requires spilling water resulting in no generation.		Generation amounts by month and compare to similar storage level at March 15th for current Master Manual. Quantity of power purchased and sold by month and compare to similar March 15 level storage for current Master Manual. Dollar amounts for purchased power and power sold, and compare to similar year for March 15 storage for current Master Manual. Track power prices, compare to normal (average?) year. Note any anomalies that might have affected prices. Footnote: The continuing drought could adversely impact the availability of supplemental or replacement power, perhaps causing a domino effect	Later peaks. Faster ramp up and downs to 35,000 cfs. Deem adverse impacts due to SR (not drought, not flood) non-reimbursable and be funded by Congressional appropriations

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Thermal				
Water quality effects of the Spring Rise alternatives on the river segments of the Missouri River	Flow regime changes from Gavins Point Dam associated with a Spring Rise, when combined with high summer air temperatures, may affect the ability of downstream water users to meet NPDES permits for thermal discharges. Depending upon the frequency of occurrence, power plants may need to reduce generation levels, or consider alternatives such as cooling ponds or cooling towers in order to maintain compliance with NPDES permits.[1]	1) Additional costs ($) associated with replacement capacity and energy. 2) Additional costs ($) associated with supplemental or alternative cooling systems.		States will enforce NPDES permit conditions for thermal discharges. Renewed NPDES permits may need to be changed due to the change in flow regimes from Gavins Point Dam. Including appropriate preclude or proration constraints for providing a Spring Rise could also help to mitigate potential impacts.
Navigation				

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Water Supply				
Water Supply effects of the Spring Rise alternatives on the river segments of the Missouri River	Flow regime changes from Gavins Point Dam associated with a Spring Rise could result in increased maintenance costs related to additional amounts of sedimentation and trash being deposited in the intake structures of water supply facilities downstream from Gavins Point dam.[1]	1) Additional costs ($) associated with cleaning silt and other debris from water supply intake structures. 2) Additional costs ($) associated with modifications to intake structures to reduce sedimentation and trash build up.		Modifications to water supply intake structures may help to reduce the build up of sedimentation and trash. Including appropriate preclude or proration constraints for providing a Spring Rise could also help to mitigate potential impacts.
Water Supply reservoirs	Loss of municipal water supply begins at the following elevations **Garrison** 1801.5 – Shutdown of Parshall **Oahe** 1564 – Shutdown Wakpala **Fort Peck ???**	Individual reservoir elevation vs. individual intake elevation	USACE database	Minimize reservoir declines, Extend intakes, alternative water supplies (expensive)

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Water Quality				
Water quality effects of the alternatives on the Missouri River mainstem lakes.	Severe fluctuations in lake elevations in Fort Peck Lake, Lake Sakakawea, and Lake Oahe may affect the size and quality of coldwater fish habitat. Coldwater Garrison 800,000 acre ft impacts 200,000 acre ft likelihood of fish kill increases.	Acre feet	State Agencies Hydroacoustic Survey	As part of the Missouri River adaptive management process, the Corps, Tribes, States, and EPA should evaluate the relationship between coldwater habitat and water quality to lake elevations based upon reliable water quality monitoring data.
Irrigation	Start losing irrigation intakes at system storage levels of ~43 MAF	Develop database on irrigation intakes	Check data	Extend / Relocate Intakes. Not always feasible

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Recreation	The CWCP does not allow for water levels to be maintained during the critical period for fish production (April-June) in mainstem reservoirs under certain runoff scenarios. Spring rise proposals which increase the loss of water from mainstem reservoirs would exacerbate the impacts to reservoir fish populations. With regard to the spring rise and fluctuating reservoir levels -the first peak should end prior to April 7 and the second peak should begin late as possible, i.e. late May, June or even July. The interphase release levels should be kept as low as possible	Under runoff scenarios which would cause reservoirs to fall during the period April – May, adopt a spring rise plan which adds water to reservoirs during the pre-rise phase and/or the interphase between rises	State fish & game agencies monitor fisheries in mainstem reservoirs.	Balance harms
Recreation	Loss of use & boat ramp access loss becomes an issue ~45 to 40 MAF	Maintain database	Check data	Extend / Relocate to the extent possible. Not possible in all instances.
Recreation	Oahe mid 90's $25 million/river Recent years $8-9 year. Similar losses to Lake Sakakawea and Fort Peck fishing industries	Under runoff scenarios which would cause reservoirs to fall during the period April – May, adopt a spring rise plan which adds water to reservoirs during the pre-rise phase and/or the interphase between rises	State agencies monitor usage	???

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Agriculture	Lost Land, lost real estate/value	1.4 million acres in the Missouri River flood plain	Historical land value/affected land vs. non-affected land	Taxpayers pay
Agriculture	Crop damage/loss of income	Dollars/acre	Farm Service Agency	$/acre x total lost acres
Agriculture	Shipping costs barge vs. rail	Shipping Rate difference - Basis in winter (no barge traffic) vs basis during navigation season	Check prices during the year. Pro Exporter, FAPRI	???
Agriculture	Loss of Market/ Disruption to barge service resulting in less places to sell grain	Water compelled rates	New or historic studies	???
Agriculture	Land Loss / erosion	Count acres	Farm Service Agency	Taxpayers pay
Agriculture	Crop Insurance	Lower average yield/base for crop insurance due to more frequent flooding	FSA	New type of insurance to cover man-made floods

	Potential Impact	**Measure**	**Monitoring Mechanism**	**Mitigation**
Riparian	Bank Degradation/loss of land	Value/acres x lost acres	USDA, real estate values	Taxpayers pay
	A. For riparian landowners on the Ponca, NE-Yankton, SD reach of the Missouri, the principal (and much dreaded) impact would be the inevitable increase in the already severe erosion. Land lost is never restored as usable land. Exacerbating the prospect of increased losses is the fact that the "spring-rise" proposal is <u>intended</u> to erode the river's shorelines. USACE <u>stated aim</u> of the "spring-rise" proposal is to put more nutrients in the water for fish. B. Bottom-degradation is lowering the river bed and also the water table. Cottonwood forests, e.g., are not replacing themselves; head-cutting on the tributaries increases, intake structures etc., have to be lowered and bridges are endangered.	A. Do not increase the flows B. Bank stabilization (would not defeat one aim of the "spring-rise." C. Compensation ($$$) for the riparian owners for land losses, etc.	Land records. USDA has aerial photos/maps via which the exact amount of the loss can be determined	COMPENSATION (see measures)

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Fish Wildlife / Ecosystem	**1st Order Social/Economic Impacts (Positives**			
Fish Wildlife / Ecosystem	• Increase in fisheries • Increase in waterfowl, raptors, birds • Increase in riparian fauna • Habitat for pollinators and biocontrol agents • Preservation of genetic diversity	• Population viability • Age structure • Reproductive success • Indicator species • Habitat index for quality • Biodiversity from baseline	State, tribal and federal agencies develop monitoring plans for various biotic and abiotic parameters	None needed---overall tremendous realization of cost savings in the long-term to numerous natural resources and other service flows
Fish Wildlife / Ecosystem	• Wildlife viewing opportunities and other recreational amenities	• State/local parks etc. visitor with satisfaction survey		None needed---overall tremendous realization of cost savings in the long-term to numerous natural resources and other service flows
Fish Wildlife / Ecosystem	• Overall cost-saving to the taxpayer less restoration efforts, T/E recovery efforts. • Reduced need for NRCS floodplain programs, wetland loss programs, and other mitigation requirements • Less $ for stocking restoration efforts	Data from state and federal agencies		None needed---overall tremendous realization of cost savings in the long-term to numerous natural resources and other service flows
Fish Wildlife / Ecosystem	• More habitat available in and adjacent to the floodplain • Improved contaminant sinks • Bio-transformation of excess nutrients	• Habitat surveys and/or indices • State/Federal agencies		None needed---overall tremendous realization of cost savings in the long-term to numerous natural resources and other service flows.

	Potential Impact	Measure	Monitoring Mechanism	Mitigation
Fish Wildlife / Ecosystem	• Production clean water (more sustainable, natural system). • Protection of recharge areas and watersheds • Detention of potential floodwaters • Reduction of erosion and sedimentation shoreline stability—Les $ for stabilization • Production of topsoil • Improved resilience to external perturbation, therefore less need to perform follow-up maintenance	• Water Quality – turbidity, metals • Physical chemical parameters • Floodplain assessment in structure and function from over-time (improvement)		None needed---overall tremendous realization of cost savings in the long-term to numerous natural resources and other service flows
	2nd Order Social/Economic Impacts: (Positives)			
Fish Wildlife / Ecosystem	• Increased tourism • Increased $ from Recreational goods/services • More $ to communities • More opportunities to capture medicinal benefits of plant/animal populations • Less cost to taxpayer for restoration, maintenance, programs • Increased fish & game based recreation • Natural groundwater recharge	Sandbars used by hunters Fishing licenses (in-state/out-of-state) Chamber of Commerce data See NAP report 2002	Need an economic model or economist	